



Scroll, Key, and Camera

Location: Southwest Guatemala

Weather Conditions: 94 degrees Fahrenheit, Humidity 46%, Rain 0%

Day 3: Tomb Reception Area, 6:08 PM

It had taken Max and Grace more than an hour to get the string properly looped over the reception area room's far peg. They had taped four fiberglass tent rods end to end, making one long rod that looked like an odd fishing pole. They were careful not to let the long pole dip too far down—it could accidentally tip over the jar and then the expedition would be in real trouble.

Before tying the other end of the string to the peg nearest the entry door, Evan had fed the string through the StringBot's string guides and under the rims and rubber wheel. When the string had finally been tied to the other peg, the StringBot was sitting on the string, about five feet above the floor. Over the past hour, the StringBot had dropped about 30 pebbles in the vase with only 4 pebbles missing the target.

Uncle Phillip, Max, and Grace had brought in some chairs and everyone was taking turns preparing the StringBot.

"Want me to take over, Evan?" asked Uncle Phillip.

Evan nodded. "Let me just load the carrier," he replied, placing a small pebble in the carrier. Uncle Phillip had asked Evan to use pebbles, explaining that if it was good enough for King Ixtua, it should be good enough for them to use. Evan had agreed.

"Okay, here goes. Remember, no talking," said Evan. He pressed the orange button on the front of the Brick and the StringBot began to move.

The team watched as the small bot began to move forward on the string. The spinning of the motors was the only sound in the quiet room. The bot moved quickly to the other side of the room, getting closer to the jar.

"Stop!" yelled Evan. He took a deep breath, hoping the bot worked just like in his earlier tests. The Sound Sensor triggered and the StringBot quickly stopped, swinging slightly left and right on the string. It then began to move again towards the jar, but this time at a slower speed.

Evan watched as the bot's carrier approached the opposite wall. He had practiced dozens of times so he could determine when to stop the bot properly so the carrier could drop the pebble into the jar. The bot moved a little closer . . .

"Stop!" Evan yelled again, louder this time so the StringBot's Sound Sensor would be triggered.

Uncle Phillip, Max, and Grace all held their breath as the StringBot stopped directly above the jar.

A few seconds passed, and then the carrier slowly swung down. The small pebble slid from the carrier and dropped straight into the mouth of the jar.

CRACK!

A few loud popping sounds were heard coming from the opposite side of the room, followed by another loud CRACK underneath the stone floor.

“Yes!” yelled Uncle Phillip, jumping to his feet. He smiled at Evan. “I think it worked!”

“Way to go, Evan,” said Grace. “Your little robot is amazing.”

Evan’s face turned red; he wasn’t used to this kind of attention. He watched the StringBot’s carrier arm close and then the motors began to spin again. The StringBot began its return on the string, ready for another small pebble to be loaded.

When the StringBot reached Evan, Evan pressed the **Cancel** button on the front of the Brick. “What now?” Evan asked, looking at the team.

Max and Grace quickly stepped outside and then returned a few seconds later, holding opposite ends of a large metal chest. “We test the floor,” Max said, as he and Grace placed the chest on the floor and then walked back outside the tomb.

“Evan, let’s go outside for a minute,” Uncle Phillip said.

Evan followed Uncle Phillip out of the tomb. As he stepped outside into the heat and bright sunlight, he saw Max holding a thick wooden rod about ten feet in length. He placed the wood on the floor and pushed it into the tomb until it connected with the metal chest. “Ready?” Max asked.

Uncle Phillip nodded.

Max pushed on the end of the wooden rod and the chest slid off the platform and onto the floor of the reception area. He pushed some more and the chest slid further to the middle of the chamber.

“Well, it looks like the trap in the room has been disabled,” said Uncle Phillip with a smile. “Are we ready to see what’s next?”

Max, Grace, and Evan all nodded.

“Alright, let me cross to the other side. Everyone can follow, one at a time, when I’m across.” Uncle Phillip walked slowly across the floor to the darkened corridor.

The King’s Library

Max had moved one of the large tripod lamps across the room. The dark corridor was now well lit, and the team could see that the tunnel extended about 20 feet forward but with a downward slope. Halfway down the corridor, Evan saw a small square opening at the bottom of the left side wall. The corridor was only four feet wide, so the team had followed Uncle Phillip down the hallway, one at a time.

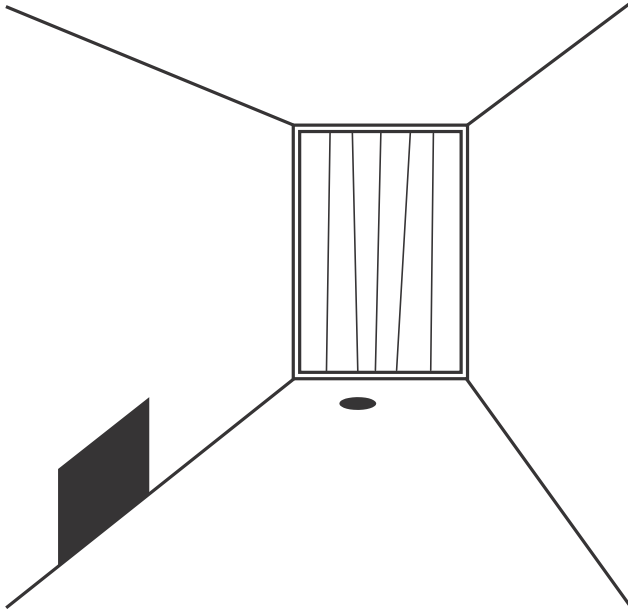


Figure 9-1. *Sketch of the corridor with the square opening and locked doorway*

“Just like the manuscript describes,” said Uncle Phillip.

Grace, walking behind Uncle Phillip, pointed further down the hallway. “And there’s the hole in the floor for the pa’aachi,” she said, pointing at a wooden doorway at the end of the corridor.

“Pa’aachi?” asked Evan, looking around Grace and Uncle Phillip to try and get a glimpse.

“It means key,” said Uncle Phillip. “The manuscript indicates that a basket, called a hu’un, was placed in the king’s library. Inside the basket is a carved bone that needs to be inserted into that hole before the door will open. And by the look of that hole, it’s going to be a very large key.”

“Where is the key?” asked Evan, already suspecting the answer.

Uncle Phillip stopped and pointed at the square opening in front of him. “In there.”

Evan watched as his uncle dropped to the floor and turned on his flashlight. He pointed the flashlight into the opening and squinted. “It’s hard to see, but the room’s dimensions look about right.”

“Can you see the basket?” asked Max.

Uncle Phillip tried to angle his head so he could see deeper into the opening. “Nope. If it’s in there, it won’t be visible to someone looking in. Once again, Tupaxu’s design appears to require one of the king’s trained monkeys.”

“Another robot?” asked Evan.

“I don’t know, Evan,” said Uncle Phillip as he stood up. “This room’s a little different and I don’t know if your bot will work here.”

While they were talking, Grace had moved down the hallway and was examining the door. She took some measurements of the door but didn't push against it. "The door may or may not be locked, but we cannot open it without the pa'aachi. The manuscript says if we open the door without the key being inserted, it will trigger another trap," she said.

Uncle Phillip scratched his head. "Well, it's getting late and I'm hungry. Let's go get some food and talk this over. Evan, I'll show you a picture of the room so you'll understand why I'm worried about using a robot. Everyone back to the tent."

Evan nodded and turned, walking with his uncle out of the tomb.

Key Retrieval Challenge

While Evan finished his macaroni and cheese dinner, his uncle walked over with one of the manuscript enlargements and placed it on the table. Evan set his plate aside and stood up to take a look.

"King Ixtua had one of the largest collections of scrolls and carved tablets in existence at the time of his death. Tupaxu had the scrolls and tablets copied and placed in the tomb. This could be one of the biggest discoveries of Mayan history ever found," said Uncle Phillip.

Max pulled a chair closer to the table. "The manuscript doesn't indicate that the library has any traps. Maybe I could crawl through the opening and get the key," he said. "The opening is large enough for a person to fit through. And I might be able to open the throne room door from the inside. I believe there's a door in there that accesses the throne room directly."

Grace smiled at Max. "Or I could crawl through," she replied. "I am smaller than you."

"Rock, Paper, Scissors?" asked Max, holding up his hands, ready to compete for the chance to see the library first.

Uncle Phillip raised his hands. "No one is going into the library until we determine it is completely safe," he said. "And I'm certain that the door in the library is probably locked as well. There will be plenty of time to examine the library and its contents later, but we need to get that key. Now, Grace, what can you tell us about this room?"

Grace stepped closer to the table and looked down at the large document on the table. She then pointed to the left side of the page. "Against this wall are jars and tables that supposedly hold the scrolls and tablets. There's no information on how many of these artifacts were placed in the library, unfortunately. On the opposite side of the room are some large tables, probably used by visiting priests or the king's family to sit and read."

"The king's family would come in to read?" asked Evan. "Why?"

Uncle Phillip smiled. "The king's family was always welcome to visit his tomb. Priests would keep the tomb clean, bring fresh flowers for all the rooms, and other tasks. King Ixtua was considered a great king and was very good to his people. The library was the king's way to make his family more comfortable when they came to visit him."

"Weird," said Evan. "Sorry to interrupt, Grace."

"No problem," she replied. "Now, here's the important part. To get into the library, visitors would have to place the pa'aachi to open the door in the corridor. The next room will be the king's throne room, and I'm certain there's a door in there that will allow us to access the library. That key is found in the basket right here," she said, pointing to the drawing.

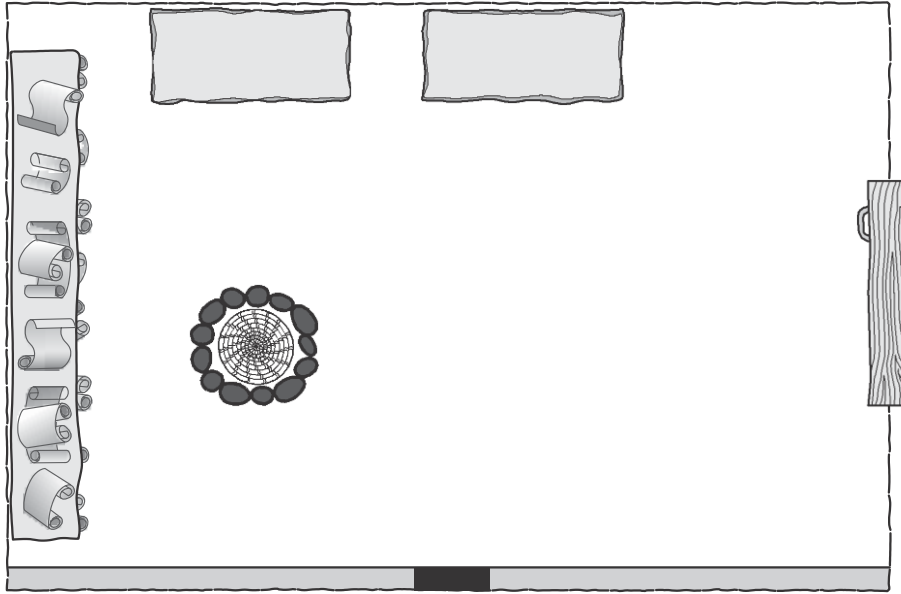


Figure 9-2. *View of King Ixtua's library and the basket holding the pa'aachi*

Evan looked at the drawing. The hand-drawn basket was surrounded by a black ring. “What is this black ring?” asked Evan.

“Probably obsidian,” replied Max. “It’s a type of glass that comes from lava that has cooled. The Mayan people used it to make weapons, but they also used it for other purposes because of its shiny black color. It’s probably set into the stone floor for decoration.”

Grace nodded. “King Ixtua probably had a monkey trained to find the black ring and then bring out the basket with the key inside. The real question is whether the rest of the floor is safe to walk across,” she said.

Uncle Phillip finally sat down in his chair. “It’s too dark inside the room to tell, and we can’t just throw a flashlight in there to check. My guess is that the room isn’t trapped, but I’m certain that if the basket is there with the key inside, it’s probably too heavy for one of Evan’s robots to bring back.”

Evan nodded. “The motors are pretty powerful, but there’s no guarantee it could grab the key or even push the basket back to us.”

“And it’s dark, too,” said Max. “Won’t your robot at least need some light?”

“Well, I have a Light Sensor that can create its own light with a small LED, but it’s only useful for determining changes in color,” replied Evan. “It’s not bright enough to light up the room.”

“Wait a minute,” said Grace. “I have an idea.”

Grace’s Solution

“You said one of the sensors could detect a change in color,” said Grace. “Can it be programmed to detect the change between the rock floor color and the black obsidian ring around the basket?”

Evan scratched his head for a moment, then nodded. “Maybe. It might be possible to have a bot search out the ring, but I still agree with Uncle Phillip that the basket and key are probably too heavy for my little bots to push. We could try it, but if the bot isn’t strong enough, we won’t be able to get it back,” replied Evan.

Grace walked over to one of the boxes holding equipment and began to rummage.

“Do you have something in mind for the weight problem, Grace?” asked Uncle Phillip.

“Yes,” she said. “If I can only find the . . . Here it is!” she yelled. She turned and held up a large ball of heavy twine.

“Twine?” asked Max.

Grace nodded. “It’s just an idea, but what if we tie the twine to the bot, send it out and around the basket, and then back to us. We untie one end of the twine from the bot and cut the other end off the ball. If we pull on the two ends of twine, we might be able to pull the basket towards us.”

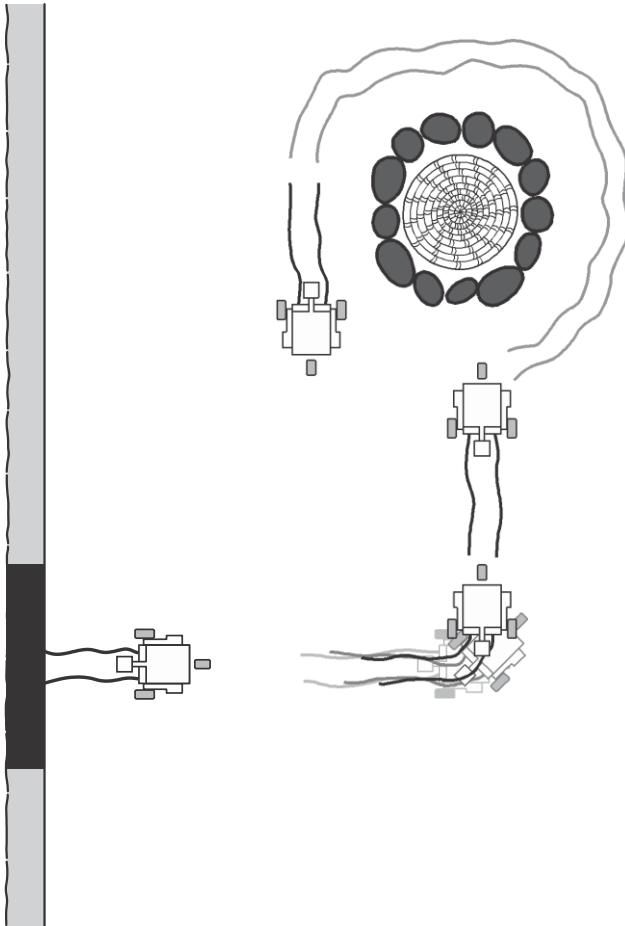


Figure 9-3. *The bot will wrap the twine around the basket and the team can pull it out.*

Uncle Phillip smiled. “Grace, I think you’ve got the right idea. How about we make it stronger by sending out two separate lines of twine? We could have one line go around the bottom of the basket and maybe one around the middle,” he added. “What do you think, Evan?”

Evan had been listening to the discussion, trying to imagine what kind of bot he’d have to build to accomplish this task. An idea began to form and he smiled.

“I think I can build a little bot to do that,” Evan replied. “I’ll have to do some testing with the Light Sensor, though. But I’m fairly sure I can do this.”

“Excellent. It looks like that little robot kit of yours is really saving us time and money. Max, when we get back home, remind me to put in a request for the archaeology department to buy a couple of them, okay?”

“Sure. I think it’ll be a great investment,” Max replied, then frowned.

“What’s wrong, Max?” asked Uncle Phillip.

Max sighed. “Well, I just wish we could see the library as it is now—something to record this little bit of history.”

Evan raised his eyebrows and thought about the request. “Well, I could attach a small camera to the bot and have it take a picture before it moves around the basket,” he said.

“You could do that?” asked Uncle Phillip.

“Sure. I’ll just need a small camera,” Evan replied.

Grace smiled. “I have a small disposable camera that has a few shots left on it. Would that work?”

Evan nodded. “Give me some time to do some testing, and I’ll have it ready by morning.”

Uncle Phillip stood up. “Well, we’ve got about three hours before the camp has lights out. If you can’t finish tonight, take what time you need tomorrow and we’ll test Grace’s idea,” he said. “We need to take care of some paperwork, Evan. So if you need us, just yell.”

“Okay. I’ll get started right now.”

Max, Grace, and Uncle Phillip walked out of the tent, and Evan pulled out his robotics kit and design journal. As he was looking for a pen in his backpack, Uncle Phillip poked his head through the tent flaps.

“Evan, thanks for all your help. We’re really glad you came along,” Uncle Phillip said. “You’re doing great work.”

“You’re welcome, Uncle Phillip,” he said. “Thanks for inviting me on the trip.”

Uncle Phillip disappeared, leaving Evan to his work.

Story continues in Chapter 13 . . .